CLAIMS

Having thus described my invention, I claim:

1. A method of processing colloidal size polytetrafluoroethylene resin particles to produce biaxially-oriented structures comprising the steps of:
   a. taking a uniaxially-oriented paste extrusion extrudate in the hydrostatic pressure coalescible state; and
   b. applying a means of stress on the uniaxially-oriented paste extrusion extrudate at approximately 90 degrees to the original extrusion direction.

2. The method claimed in claim **1** wherein the means of applying stress is rolling.

3. The method claimed in claim **1** wherein the means of applying stress is calendering.

4. The method claimed in claim **1** wherein the means of applying stress is blowing.

5. A biaxially-oriented polytetrafluoroethylene sheet made from uniaxially-oriented past extrusion extrudate in the hydrostatic pressure coalescible state produced by applying a means of stress in that extrudate 90 degrees to the original extrusion direction.

6. The sheet of claim **5** wherein the means of applying stress is rolling.

7. The sheet of claim **5** wherein the means of applying stress is calendering.

8. The sheet of claim **5** wherein the means of applying stress is blowing.

9. The sheet of claim **5** wherein the sheet contains particulate filler less than 25 microns in size.

10. The sheet of claim **5** wherein the sheet contains particulate additive less than 25 microns in size.

11. The sheet of claim **9** wherein the sheet contains particulate additive less than 25 microns in size.

12. The sheet of claim **5** wherein the sheet is in tubular form.

13. The sheet of claim **9** wherein the sheet is in tubular form.

14. The sheet of claim **10** wherein the sheet is in tubular form.

15. The sheet of claim **11** wherein the sheet is in tubular form.

16. The sheet of claim **5** wherein the sheet is in laminate form.

17. The sheet of claim **9** wherein the sheet is in laminate form.

18. The sheet of claim **10** wherein the sheet is in laminate form.

19. The sheet of claim **11** wherein the sheet is in laminate form.

20. The sheet of claim **9** wherein a tensile strength based on original dimensions divided by the volume fraction of polytetrafluoroethylene resin present in the sheet exceeds 5,000 psi in the finished form.

21. The sheet of claim **10** wherein a tensile strength based on original dimensions divided by the volume fraction of polytetrafluoroethylene resin present in the sheet exceeds 5,000 psi in the finished form.

22. The sheet of claim **11** wherein a tensile strength based on original dimensions divided by the volume fraction of polytetrafluoroethylene resin present in the sheet exceeds 5,000 psi in the finished form.

23. The sheet of claim **12** wherein a tensile strength based on original dimensions divided by the volume fraction of polytetrafluoroethylene resin present in the sheet exceeds 5,000 psi in the finished form.

24. The sheet of claim **13** wherein a tensile strength based on original dimensions divided by the volume fraction of polytetrafluoroethylene resin present in the sheet exceeds 5,000 psi in the finished form.

25. The sheet of claim **14** wherein a tensile strength based on original dimensions divided by the volume fraction of polytetrafluoroethylene resin present in the sheet exceeds 5,000 psi in the finished form.

26. The sheet of claim **15** wherein a tensile strength based on original dimensions divided by the volume fraction of polytetrafluoroethylene resin present in the sheet exceeds 5,000 psi in the finished form.

27. The sheet of claim **16** wherein a tensile strength based on original dimensions divided by the volume fraction of polytetrafluoroethylene resin present in the sheet exceeds 5,000 psi in the finished form.

28. The sheet of claim **17** wherein a tensile strength based on original dimensions divided by the volume fraction of polytetrafluoroethylene resin present in the sheet exceeds 5,000 psi in the finished form.

29. The sheet of claim **18** wherein a tensile strength based on original dimensions divided by the volume fraction of polytetrafluoroethylene resin present in the sheet exceeds 5,000 psi in the finished form.

30. The sheet of claim **19** wherein a tensile strength based on original dimensions divided by the volume fraction of polytetrafluoroethylene resin present in the sheet exceeds 5,000 psi in the finished form.

31. A method of forming a biaxially-oriented hydrostatic pressure coalescible sheet comprising the steps of:

a. taking a biaxially-oriented hydrostatic pressure coalescible sheet; and

b. applying a means of force to form a complex shape.

32. The method claimed in claim **31** wherein the means of applying force is stretching the sheet.

33. The method claimed in claim **31** wherein the means of applying force is compression.

34. The method claimed in claim **31** wherein the means of applying force is extursion.

35. The method claimed in claim **1** further comprising the step of applying heat up to 300 degrees Centigrade to plasticize and assist the forming and shaping the hydrostatic pressure coalescible biaxially-oriented structures.

36. A method of producing a biaxially-oriented tube comprising the step of blow molding a uniaxially-oriented hydrostatic pressure coalescible tube.

37. A method of producing a biaxially-oriented sintered tube comprising the step of blow molding a uniaxially-oriented hydrostatic pressure coalescible tube.

38. A biaxially-oriented tube containing fillers.

39. A biaxially-oriented sintered tube containing fillers.

40. A biaxially-oriented tube containing additives.

41. A biaxially-oriented sintered tube containing additives.

42. The biaxially-oriented tube of claim **40** further containing fillers.

43. The biaxially-oriented sintered tube of claim **41** further containing fillers.

44. A process for reducing the macro-size of commercial polytetrafluoroethylene coagulated dispersion resin to the colloidal size of the particles contained within the coagulate comprising the steps of:

a. suspending the colloidal size polytetrafluoroethylene particles are suspended in a wetting liquid wherein the colloidal size polytetrafluoroethylene resin in the hydrostatic pressure coalescible condition is in biaxially-oriented form; and

c. producing blends of the colloidal particles.

45. The process claim of claim **44** wherein:
the blends of the colloidal particles contain fillers less than 25 microns in size.

46. The process claim of claim **44** wherein:

the blends of the colloidal particles contain additives less than 25 microns in size.

47. The process claim of claim **45** wherein:

the blends of the colloidal particles contain additives less than 25 microns in size.

48. The process claim of claim **44** wherein:

the colloidal size polytetrafluoroethylene resin is blended with at least one polymeric material in particulate form;

the polymeric particles are below 20 microns in size; and

the polymeric particles have never been melted.

49. A method of preparing a porous biaxially-oriented polytetrafluoroethylene composition comprising the steps of:

a. adding fugitive materials as fillers; and

b. sintering the composition.

50. The method claim of claim **49** wherein the size of the fugitive additive particle determines the resulting pore size.

51. The method claim of claim **49** further comprising the step of removing the pore former.

52. The method claim of claim **51** wherein the pore former is removed by leaching with water.

53. The method claim of claim **51** wherein the pore former is removed by chemical reaction.

54. The method claim of claim **51** wherein the pore former is removed by thermal decomposition at sintering temperatures.

55. A porous membrane structure of biaxially-oriented polytetrafluoroethylene with void content up to 90 percent containing fillers.

56. A porous membrane structure of biaxially-oriented polytetrafluoroethylene with void content up to 90 percent containing polymer additives.

57. The porous membrane structure of biaxially-oriented polytetrafluoroethylene of claim **55** wherein the structure contains polymer additives.

58. An asymmetric porous structure of biaxially-oriented polytetrafluoroethylene made according to the process of claim **49** having laminant layers.

59. The asymmetric porous structure of biaxially-oriented polytetrafluoroethylene of claim **58** wherein each laminant layer contains a different pore size.

60. The asymmetric porous structure of biaxially-oriented polytetrafluoroethylene of claim **58** having a tensile strength based on the original sheet dimensions when divided by the volume fraction for polytetrafluoroethylene resin present, which exceed 5,000 psi.

61. The asymmetric porous structure of biaxially-oriented polytetrafluoroethylene of claim **59** having a tensile strength based on the original sheet dimensions when divided by the volume fraction for polytetrafluoroethylene resin present, which exceed 5,000 psi.